

**SECTION 04 72 00**  
**CAST STONE AND CALCIUM SILICATE MASONRY UNITS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This sections specifies manufactured concrete units and calcium silicate units to simulate a natural stone
- B. Installation of masonry units.

**1.2 RELATED WORK**

- A. Setting and pointing mortar: Section 04 05 13, MASONRY MORTARING / Section 04 05 16, MASONRY GROUTING.
- B. Joint sealant and application: Section 07 92 00, JOINT SEALANTS.
- C. Color and texture specified in Section 09 06 00, SCHEDULE FOR FINISHES.

**1.3 SUBMITTALS**

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
  - 1. Sample panel, size 100 by 300 by 300 mm (4 by 12 by 12 inches) each color and finish of each product.
  - 2. Show finish on two 100 mm (4-inch) edges and 300 by 300 mm (12 by 12 inch) surface of each product.
- C. Shop Drawings:
  - 1. Showing exposed faces, profiles, cross sections, anchorage, reinforcing, jointing and sizes.
  - 2. Setting drawings with setting mark.

**1.4 PRODUCT DELIVERY, STORAGE AND HANDLING**

- A. Store under waterproof covers on planking clear of ground.
- B. Protect from handling, dirt, stain, and water damage.
- C. Mark production units with the identification marks as shown on the shop drawings.
- D. Package units and protect them from staining or damage during shipping and storage.

**1.5 WARRANTY**

Warranty exterior masonry walls against moisture leaks, any defects and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be two years.

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**1.6 APPLICABLE PUBLICATIONS**

- A. Publications listed below form a part of this specification to extent referenced.  
Publications are referenced in text by the basic designation only. Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
- B. Cast Stone Institute Technical Manual and Cast Stone Institute standard specifications.
- C. American Society for Testing and Materials (ASTM):
- C33-11 .....Concrete Aggregates
  - C150-09 .....Portland Cement
  - C979-10 .....Pigments for Integrally Colored Concrete
  - C1194-03 .....Compressive Strength of Architectural Cast Stone
  - C1195-03 .....Absorption of Architectural Cast Stone
  - C1364-10 .....Architectural Cast Stone.
  - C73.....Specification for Calcium Silicate Face Brick

**1.7 QUALITY ASSURANCE**

- A. The Manufacturer:
1. Must have ten (5) years minimum continuous operating experience and have facilities for manufacturing cast stone as described herein.
  2. Must have a certified plant (certification by the Cast Stone Institute).
- B. Stone setter: Must have ten (5) years experience setting cast or natural building stone.

**1.8 MANUFACTURING TOLERANCES**

- A. Cross section dimensions shall not deviate by more than + 1/8 in. (3 mm) from approved dimension.
- B. Length of units shall not deviate by more than length /360 or + 1/8 in. (3mm), whichever is greater, not to exceed + 1/4 in (6 mm). Maximum length of any unit shall not exceed 15 times the average thickness of such unit unless otherwise agreed by the manufacturer.
- C. Warp bow or twist of units shall not exceed length/360 or + 1/8 in. (3 mm), whichever is greater.

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- D. Location of dowel holes, anchor slots, flashing grooves, false joints and similar features  
– On formed sides of unit, 1/8 in (3 mm), on unformed sides of unit, 3/8 in (9 mm)  
maximum deviation.

**1.9 MOCK-UP**

Provide full size unit(s) for use in construction of sample wall. The mock-up becomes the standard of workmanship for the project.

**PART 2 - PRODUCTS**

**2.1 ARCHITECTURAL CAST STONE**

- A. Comply with ASTM C 1364
- B. Physical properties: Provide the following:
1. Compressive Strength – ASTM C 1194: 6,500 psi (45 Mpa) minimum for products at 28 days.
  2. Absorption – ASTM C 1195: 6% maximum by the cold water method, or 10% maximum by the boiling method for products as 28 days.
  3. Air Content – ASTM C173 or C231, for wet cast product shall be 4-8% for units exposed to freeze-thaw environments. Air entrainment is not required for vibrant dry tamp (VDT) products.
  4. Freeze thaw - ASTM C 1364L The cumulative percent weight loss (CPWL) shall be less than 5% after 300 cycles of freezing and thawing.
  5. Linear Shrinkage - ASTM C 426L Shrinkage shall not exceed 0.065%.

**2.2 CALCIUM SILICATE MANUFACTURED STONE MASONRY**

- A. Comply with ASTM C 73
- B. Physical properties: Provide the following:
1. Solid units pressure formed and autoclaved: Grade SW: 3 5/8" bed depth.
  2. Modular Sizes as indicated on drawings with special shapes as noted.
  3. Texture: smooth on exposed faces and ends.
  4. Color: As scheduled.

**2.3 JOB SITE TESTING**

- A. One (1) sample from production units may be selected at random from the field for each 500 cubic feet (14m<sup>3</sup>) delivered to the job site:

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1. Three (3) field cut cube specimens from each of these samples shall have an average minimum compressive strength of not less than 85% with no single specimen testing less than 75% of design strength as allowed by ACI 318.
2. Three (3) field cut cube specimens from each of these samples shall have an average maximum cold-water absorption of 6%.
3. Field specimens shall be tested in accordance with ASTM C 1194 and C 1195.

**2.4 RAW MATERIALS (CAST STONE)**

- A. Portland cement – Type I or Type III, white and/or grey, ASTM C 150.
- B. Coarse aggregates – Granite, quartz or limestone, ASTM C 33, except for gradation, and are optional for the vibrant dry tamp (VDT) casting method.
- C. Fine aggregates – Manufactured or natural sands, ASTM C 33, except for gradation.
- D. Colors – Inorganic iron oxide pigments, ASTM C 979 except that carbon black pigments shall not be used.
- E. Admixtures- Comply with the following:
  1. ASTM C 260 for air-entraining admixtures.
  2. ASTM C 494/C 495 M Types A-G for water reducing, retarding, accelerating and high range admixtures.
  3. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists, shall be previously established as suitable for use in concrete by proven field performance or through laboratory testing.
  4. ASTM C 618 mineral admixtures of dark and variable colors shall not be used in surfaces intended to be exposed to view.
  5. ASTM C 989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
- F. Water – Potable
- G. Reinforcing bars:
  1. ASTM A 615/A 615M. Grade 40 or 60 steel galvanized or epoxy coated when cover is less than 1.5 in. (37 mm).
  2. Welded Wire Fabric: ASTM A 185 where applicable for wet cast units.

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- H. All anchors, dowels and other anchoring devices and shims shall be standard building stone anchors commercially available in a non-corrosive material such as zinc plated, galvanized steel, brass, or stainless steel Type 302 or 304.

**2.3 COLOR AND FINISH**

- B. All surfaces intended to be exposed to view shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 in. (0.8 mm) and the density of such voids shall be less than 3 occurrences per any 1 in<sup>2</sup> (25mm<sup>2</sup>) and not obvious under direct daylight illumination at a 5 ft. (1.5m) distance.
- C. Units shall exhibit a texture approximately equal to the approved sample when viewed under direct daylight illumination at a 10 ft (3m) distance.
- D. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
1. Total color difference - not greater than 6 units.
  2. Total hue difference-not greater than 2 units.

**2.4 REINFORCING**

- A. Reinforce the units as required by the drawings and for safe handling and structural stress.
1. Minimum reinforcing shall be 0.25 percent of the cross section area.
- C. Minor chipping resulting from shipment and delivery shall not be grounds for rejection. Minor chips shall not be obvious under direct daylight illumination from a 20-ft (6m) distance.
- D. The occurrence of crazing or efflorescence shall not constitute a cause for rejection.
- E. Remove cement film, if required, from exposed surface prior to packaging for shipment.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

Installing contractor shall check cast stone and calcium silicate materials for fit and finish prior to installation. Do not set unacceptable units.

**3.2 SETTING TOLERANCES**

- A. Comply with Cast Stone Institute <sup>SM</sup> Technical Manual.
- B. Set stones 1/8 in. (3 mm) or less, within the plane of adjacent units.
- C. Joints, plus - 1/6 in. (1.5 mm), minus - 1/8 in. (3 mm).

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**3.3 JOINTING**

A. Joint size:

1. At stone/brick joints 3/8 in. (9.5 cm).
2. At stone/stone joints in vertical position 1/4 in. (6 mm) (3/8 in. (9.5 mm) optional).
3. Stone/stone joint exposed on top 3/8 in. (.5 mm).

B. Joint Materials:

1. Mortar, Type N, ASTM C 270.
2. Use a full bed of mortar at all bed joints.
3. Flush vertical joints full with mortar.
4. Leave all joints with exposed tops or under relieving angles open for sealant.
5. Leave head joints in coping and projecting components open for sealant.

B. Location of joints:

1. As shown on shop drawings.
2. At control and expansion joints unless otherwise shown.

**3.4 SETTING**

- A. Drench units with clean water prior to setting.
- B. Fill dowel holes and anchor slots completely with mortar or non-shrink grout.
- C. Set units in full bed of mortar, unless otherwise detailed.
- D. Rake mortar joints 3/4 in. (18 mm) in. for pointing.
- E. Remove excess mortar from unit faces immediately after setting.
- F. Tuck point unit joints to a slight concave profile.

**3.5 JOINT PROTECTION**

- A. Comply with requirements of Section 07 92 00, JOINT SEALANTS.
- B. Prime ends of units, insert properly sized backing rod and install required sealant.

**3.6 REPAIR AND CLEANING**

- A. Repair chips with touchup materials furnished by manufacturer.
- B. Saturate units to be cleaned prior to applying an approved masonry cleaner.
- C. Consult with manufacturer for appropriate cleaners.

**3.7 INSPECTION AND ACCEPTANCE**

Inspect finished installation according to Bulletin #36 published by the Cast Stone Institute.

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SECTION 32 14 13  
PRECAST CONCRETE UNIT PAVERS

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section Includes:
  - 1. Architectural Concrete Slab Paver Units

**1.2 REFERENCES**

- A. American Society for Testing and Materials (ASTM).
- B. Canadian Standards Association (CSA). CSA A231.1-99

**1.3 GENERAL CONDITIONS**

- A. As specified in Division 1

**1.4 SUBMITTALS**

- A. Product Data: Include manufacturer's product data sheet.
- B. Shop Drawings: Include Setting Drawings showing layouts, sizes, sections, profiles, and joint details of Slab Paver with Slab Paver support assemblies and termination conditions.
- C. Samples – For the following products:
  - 1. Architectural Slab Paver
  - 2. Aluminum edging
- D. Installer Certificates: Signed by manufacturer, certifying that installers comply with requirements.
- E. Recycle Content: Indicate recycled content including percentage of pre-consumer and post-consumer recycled content per unit
- F. Local/Regional Materials:
  - 1. Indicate location of manufacturing facility; indicate distance between manufacturing facility and the project site.
  - 2. Indicate location of extraction, harvesting and recovery.
- G. Albedo data: Provide information identifying the reflectance of the following products provided under work of this Section:
  - 1. Architectural slab unit pavers

**1.5 QUALITY ASSURANCE**

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- A. Installer Qualifications: Qualified installers must show successful completion of three (3) similar sized project applications within the last three (3) years. The installer shall assign mechanics from these earlier applications, one of whom shall serve as lead mechanic. Installers not meeting these criteria shall require approval from the specifier or manufacturer prior to installation.
- B. Provide Slab Pavers that are free of cracks, seams, and defects impairing appearance, structural integrity or function.
- C. Contractor shall conform to all local, state licensing and bonding requirements.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials to project site in original packages labeled with manufacturer's name.
- B. Store materials in a clean, dry, protected location.

**1.7 PROJECT CONDITIONS**

- A. Environmental Limitations: Install Slab Pavers in accordance with manufacturer's instructions.

**PART 2 - PRODUCTS**

**2.1. ARCHITECTURAL SLAB PAVERS**

- A. Supplied by: Mutual Materials, or equal.
  - a. Slab Paver name, color, finish and Dimensions
  - b. Vancouver Bay Series, Latte, Light Shot-Blast, 24" x 24", or approved.

**2.2. ALUMINUM EDGING**

- A. Supplied by: Sure-Loc, or equal.
  - a. Name, color, finish and Dimensions
  - b. Sure-Loc SureEdge, Mill Finish, 3/16" x 4", or approved.

**PART 3 - EXECUTION**

**3.01 EXAMINATION**

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.02 SURFACE PREPARATION**

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- A. Compact the subgrade to at least 95% of standard Proctor density as specified in ASTM D 698.
- B. Place and compact a base of 5/8" minus crushed rock in layers of not less than 4" to a smooth uniform surface to the grade and cross section required. The minimum surface tolerance of the compacted base should be 3/8 in. over a 10 ft straight edge.

**3.03 INSTALLATION**

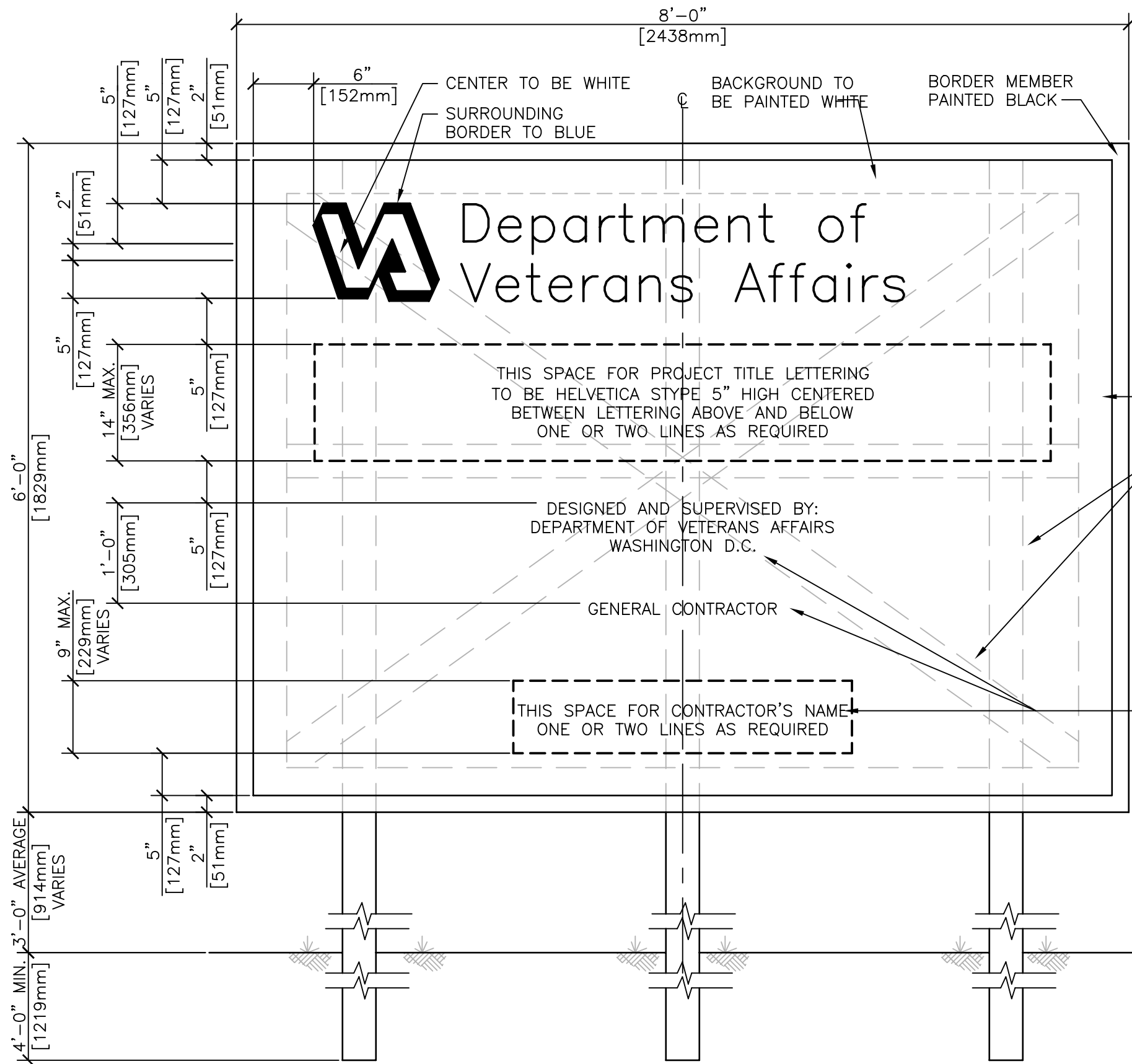
- A. Install the aluminum edging to prevent settling and spreading. Follow manufacturer's instructions for installing edging.
- B. Install, spread and screed bedding sand to a thickness of 1 to 1 1/2 inches. Bedding sand under architectural slabs should meet ASTM C 33 or CSA A23.1 specifications.
- C. Install "Architecturally Finished" pavers accurately aligning and maintaining uniform spacing, with straight joints from end to end. Joint widths between slabs should be 1/8".
- D. Install Slab Pavers to vary not more than 1/16" in elevation between adjacent Slab Pavers or more than 1/16" variation from surface plane elevation of any individual Slab Paver.
- E. After placing slabs, lightly compact them using a vibrating plate compactor. Place sheets of plywood or cardboard between slabs and compactor to prevent scuffing.
- F. Sweep dry joint sand into joints.
- G. Field cutting: Use power saws to cut Slab Pavers. Produce lines cut straight and true, with edges eased slightly to prevent chipping.

**3.04 PAVER PROTECTION AND CLEANING**

- A. In order to protect their aesthetic appearance, Architectural Slabs should be installed as the final stage of the construction project. If this is not possible, then it is imperative that a protective covering be placed over them until all other sub-trades have completed their work.

A.

END OF SECTION



ELEVATION

PAINT BORDER  
MEMBER  
BLACK ENAMEL

ALL LETTERING TO BE  
PAINTED BLACK WITH  
EXCEPTION OF PROJECT  
TITLE WHICH IS TO BE  
BLUE

2"x4" [51x102mm]  
FRAME AND BRACES  
IN SAME PLANE

METAL FACE  
WHITE ENAMEL

2"x4" [51x102mm]  
FRAME AND BRACE IN  
BACK

METAL FACE

STRETCH METAL  
FACE TIGHT, TURN  
OVER FRAME AND  
SECURE WITH FLAT  
HEAD DEFORMED  
NAILS.

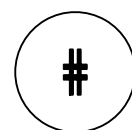
LETTERING TO BE  
HELVETICA STYLE 1 1/2"  
[38mm] HIGH TO BE  
CENTERED HORIZONTAL

NOTE:

ANY SEAM IN METAL TO  
BE FLAT SEAM - SEAMS  
TO BE HORIZONTAL AND  
OCCUR BETWEEN LINES  
OF LETTERING.

4"x4" [102x102mm]  
POSTS PAINTED WHITE

SECTION ON CENTERLINE



CONSTRUCTION SIGN

NTS

DETAIL TITLE / CONSTRUCTION SIGN

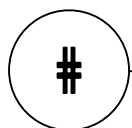
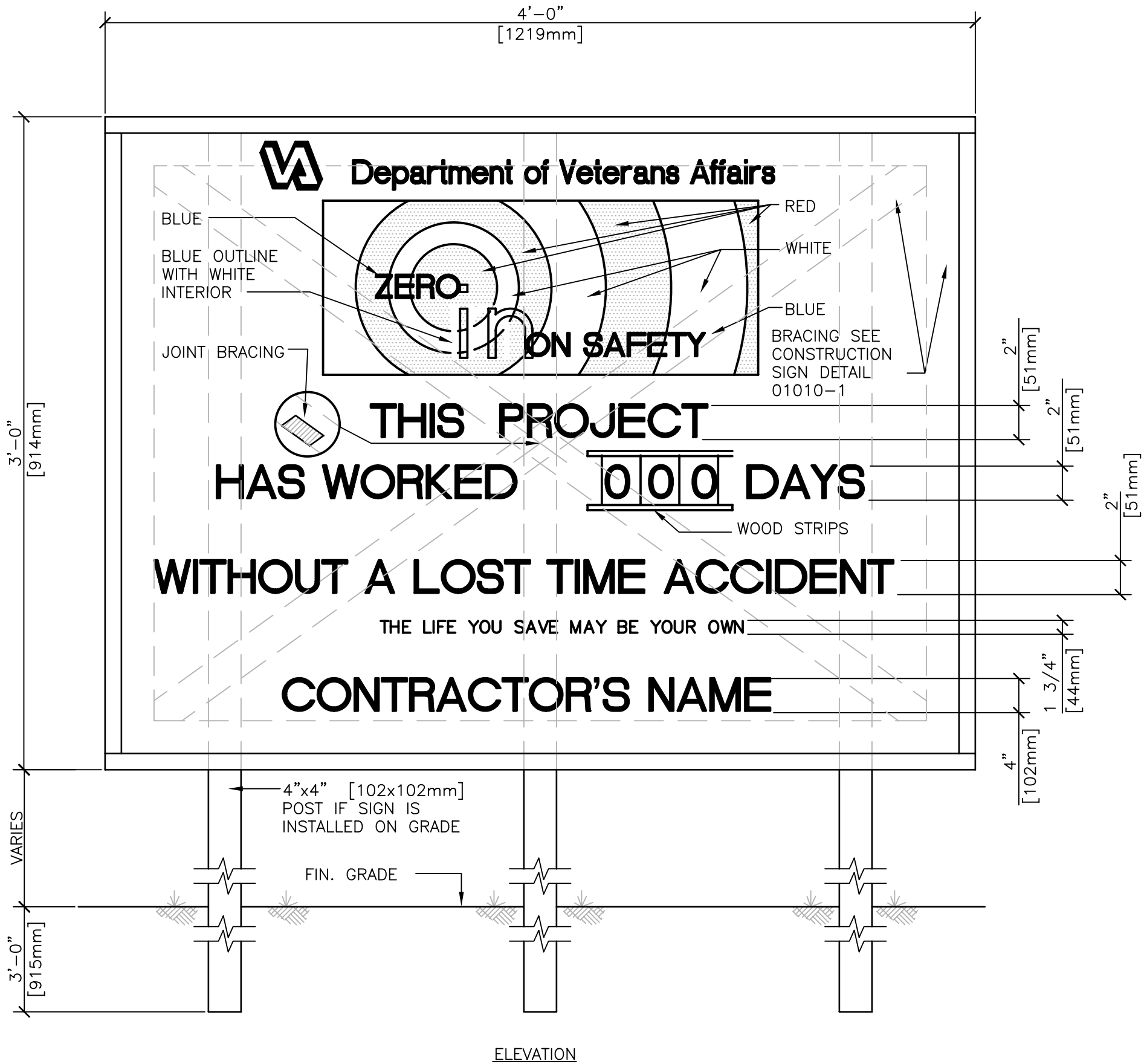
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SCALE : NONE

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SAFETY SIGN

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